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Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 312 900
A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 88116913.0

(21) Int. Cl. 4: B65F 3/04

(22) Date of filing: 12.10.88

(30) Priority: 23.10.87 IT 2240087

(43) Date of publication of application:
26.04.89 Bulletin 89/17

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR LI LU NL SE

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(54) A device for engaging, lifting and tilting trash or refuse bins, intended for side loading trucks.

(57) A device (9) for engaging, lifting and tilting a trash or refuse bin (10), intended for a side loading truck (1), which features a simple and reliable construction and provides for full discharge of the trash material from the bin (10) into the truck (1), comprises an articulated quadrilateral (27) for bin lifting having its fixed side (17) associated with a slide (12) slidable toward and away from the bin (10), its moving side (21) carrying bin-engaging arms (11), and a pair of rocker arms (25,26) wherein the lower rocker arm (26) is extensible by rotation of the moving side (21) of the quadrilateral (27) about the end of the upper rocker arm (25), to turn the bin (10) upside down and accordingly discharge the trash material into the truck body (2), or truck (1) hopper if so equipped.

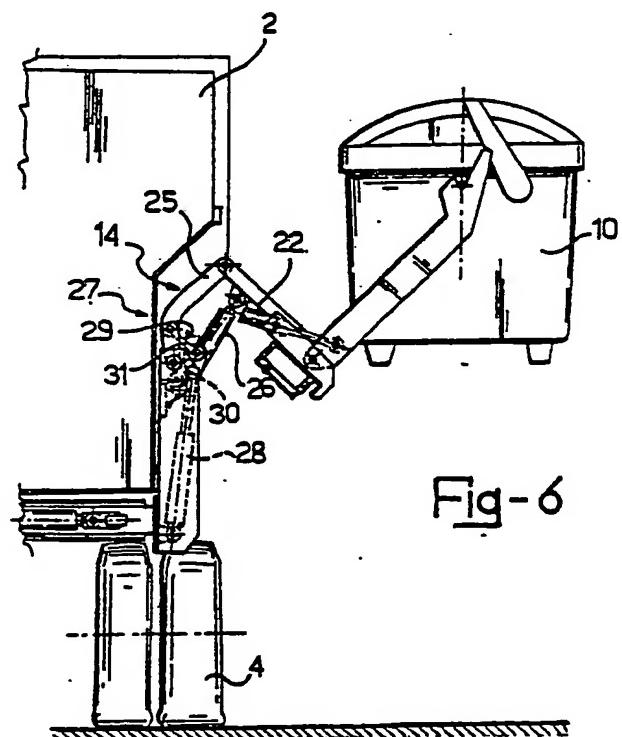


Fig - 6

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This invention relates to a device for engaging, lifting and tilting a trash or refuse bin, intended for a side loading truck, being of a type which comprises bin-engaging arms, and bin-lifting and -tilting means associated with a slide movable toward and away from the bin and mounted on the truck.

It is a known fact that picking up refuse collected into bins, by the use of a so-called side loading truck, requires that the operations be performed in an automatic manner of engaging the bin, lifting it off the ground, and tilting it over an opening provided in the truck body or hopper, so as to have the bin turned upside down and the refuse material discharged by gravity from the bin into the truck.

In other words, refuse collected into the refuse bins should be picked up by the truck without any manual intervention of operators to push the bins toward the truck and its bin-engaging arms.

A conventional device currently employed comprises, associated with the slide, an upright structure having two crank arms journalled on its top end, wherein the horizontally laid arm in its lowered position locates level with the bin engagement plane. It may be appreciated that inasmuch as such arms are to pick up the bin from ground starting with the anchoring point of the bin engagement trunnions, the hinge point of the upright boom of the crank arms should be positioned to such a level that, as said arms are moved angularly upwards, the bin can be lifted higher than the threshold for discharging the refuse into the truck body, or loading hopper if so equipped. Accordingly, the path travelled by the bin from ground to up to the height setting for its emptying will lie along an arc whose radius is equal to the distance from the hinge center of the arms to the bin engagement trunnions.

This prior approach, while substantially achieving its object, has the drawback that the bin is progressively tilted as it is lifted; this results for the reasons set forth above, and since said arms are to travel along a large radius curved path, in refuse material being dispersed in advance of its desired discharging position, that is with the bin at its highest level right over the truck body refuse loading opening or hatch.

Another problem is that, since the arms are of necessity a cranked design, after the bin has been laid back onto ground, they occupy a lowered position, with the horizontal boom of the arms protruding beyond the vehicle outline limits. Thus, the lifting and rotating course for said crank arms has to be gone through once again to bring them to their upper positions within the outline limits before the truck can start moving; this results, of course, in increased downtime in the truck opera-

tion sequence.

A further problem, due to the large radius of curvature of the travel path of said arms, is that where a bin happens to be placed on the ground close to immovable obstructions, such as building walls, poles, parked vehicles, etc., the bin lifting operation is apt to be hindered by such obstructions.

Another prior approach provides a device having vertical guides associated with the slide, intended for a lifter movable in a vertical direction by means of roller chains, much in the same way of the load-engaging forks of lift trucks or the like.

The lifter is equipped with a tilting mechanism mounting the bin-engaging arms. This conventional device enables the bin to be tilted over as it reaches its highest point, but has the well-recognized drawback of a highly complex construction, which reflects in high cost and low reliability in operation.

The problem underlying this invention is to provide a device of the kind outlined above which has such structural and performance characteristics as to meet the above-noted demand, while overcoming the cited drawbacks affecting the prior art.

This problem is solved by a device as indicated being characterized in that said bin-lifting means comprises an articulated quadrilateral having a fixed side rigid with the slide, a pair of rocker arms, and a movable side to which the bin-engaging arms are connected.

Advantageously, one of the rocker arms can be extended by the action of a drive means, said extensible rocker arm constituting said bin-tilting means.

Further features and the advantages of the engaging device according to this invention will be more clearly understood by making reference to the following detailed description of a preferred embodiment thereof, to be taken by way of illustration and not of limitation in conjunction with the accompanying drawings, where:

Figure 1 is a fragmentary side view of a side loading truck incorporating a device for engaging, lifting and tilting a trash or refuse bin, according to the invention;

Figure 2 is a part-sectional rear view of the truck shown in Figure 1, taken along the line II-II; and

Figures 3, 4, 5, 6, and 7 are further part-sectional rear views of the truck shown in Figure 1, illustrating different operation stages of the device.

With reference to the drawing views, the numeral 1 designates comprehensively a side loading truck for picking up refuse or trash material, which has a truck body 2 of rectangular cross-sectional shape installed on a truck frame 3 mounted on

wheels 4. The truck body 2 is formed, on a side wall 5 thereof, with a recess 6 having a right trapezoidal cross-section shape with an oblique side 7 sloping down inwards of the truck body. An opening 8 is provided in the truck body 2 which spans both a portion of the wall 5 starting with the oblique side 7 and almost the entire top wall of the truck body.

The recess 6 and opening 8 extend by the same distance along the truck body 2 length, starting with the rear end of the truck.

The truck 1 comprises a device 9 for engaging, lifting, and tilting a bin 10.

The device 9 comprises two identical bin-engaging arms 11, intended for picking up the bin 10; said arms 11 being associated, in a manner to be described, with a slide 12 mounted on the truck, said slide being movable, by the action of an oil-operated cylinder 13, crosswise to the longitudinal axis of the truck, between a home position with the slide retracted inside the truck and a bin-engaging position with the slide extended from the truck cantilever fashion.

The device 9 further comprises a lifting means 14 for the bin-engaging arms 11, and tilting means 15 for the bin-engaging arms 11, placed between said arms 11 and the slide 12.

The slide 12 is formed by a horizontal sheet-like element 16 and a vertical sheet-like element 17 connected at right angles to each other. The horizontal element 16 is guided slidably in a seat 18 formed transversely in the frame 3. The vertical sheet-like element 17 extends in parallel with the side wall 5 and fits in the recess 6 with the slide in its retracted position.

The arms 11 have respective ends journalled to carriages 19 which are mounted along end portions 20 of an elongate body 21 extending longitudinally.

Two oil-operated cylinders 22, one for each arm 11, are provided for moving angularly in a vertical plane respective arms 11 about their end journalled on respective carriages 19, between a raised home position out of the way where the arms lie vertically close against the element 17, and an operating position where the arms are extended cantilever fashion to engage with the bin at the opposite end, provided with a special V-shaped engagement seat 23.

An oil-operated cylinder 24 extends between the two carriages 19 and acts thereon to drive the carriages along the elongate body 21 to and fro, as required.

The elongate body 21 is connected to the element 17 by two identical pairs of rocker arms 25 and 26, indicated at 25 being the upper rocker arm and at 26 the lower one.

Each pair of rocker arms 25 and 26 forms, in

cooperation with the sheet-like element 17 and the elongate body 21, an articulated quadrilateral, indicated at 27, wherein the sheet-like element 17 forms the so-called fixed side and the elongate body 21 the so-called moving side.

The elongate body 21 is, by virtue of its connection to the element 17 of the slide 12 via said pairs of rocker arms 25 and 26, movable between a home position where it locates substantially beneath the element 17 and an operating position where it locates remote from said element.

To drive the elongate body 21 between said two positions, two identical oil-operated cylinders 28 are provided which lie side-by-side and have one end journalled on the element 17 and the other end arranged to act on a toggle mechanism device 29 formed by two rods 30 and 31 having first ends journalled to each other and to one end of said oil-operated cylinders, and second ends journalled on the element 17 and the upper rocker arm 25, respectively.

The articulated quadrilaterals 27 and oil-operated cylinders 28 constitute together the aforementioned arm lifting means 14.

The lower rocker arm 26 can be extended by the action of a drive means 32, with the elongate body 21 in its operating position.

In particular, the lower rocker arm 26 consists of an oil-operated cylinder 33 having its ends journalled on the element 17 and elongate body 21, respectively. The oil-operated cylinder 33, which can be brought to a condition of minimum length when the piston rod is fully retracted and to a condition of maximum length when the piston rod is fully extended, itself constitutes the drive means 32 for extending the rocker arm 26.

Under the drive from the oil-operated cylinder 33, the elongate body 21 performs an angular movement about the upper rocker arm 25, between a lowered position and a raised position, to result in the bin-engaging arms and the bin itself being rotated.

The extensible rocker arm 26 and its related drive means 32, i.e. the oil-operated cylinder 33, constitute the aforesaid means 15 of rotating the bin-engaging arms 11.

The operation of the device according to the invention will be now described with reference to a starting condition, depicted in Figures 1 and 2, whereunder the slide, elongate body, and arms are all in their respective home positions.

It should be noted that with the device under this starting condition, the element 17, elongate body 21, and arms 11 will not protrude from the truck outline limit, but rather fit inside it by partly occupying the recess 6.

To effect the desired lifting and tilting of the bin 10, the arms 11 are driven angularly to their op-

erating positions (re. Figure 3). The slide 12 is then moved to the pick up position, where the V-shaped seats 23 of the arms locate beneath the corresponding engagement members on the bin (re. Figure 4). By means of the oil-operated cylinder 24, the carriages 19 are driven toward each other such that the arms 11 clamp around the bin.

At this moment, the bin is lifted just clear of the ground by means of the oil-operated cylinders 28, and the slide is restored to its original home position (re. Figure 5).

Presently, the bin lifting is completed, again by means of the oil-operated cylinders 28 (re. Figure 6). Under this condition, the bin will be occupying a raised position, laterally of the truck body 2, substantially level with the opening 8 close to the oblique side 7 sloping inwards of the truck body.

Eventually, the bin is tilted over, by means of the oil-operated cylinder 33 which, when extended, causes the elongate element 21, and hence the arms 11, to be perform an angular movement and the bin to be turned upside down over the opening 8.

By performing the above-noted operations in the reverse order, the device is brought back to its original position, along with the bin, now empty.

A major advantage of the device according to this invention is that it enables the bin contents to be discharged in a rapid and reliable manner, with no droppings, and in a fully automatic fashion.

A further advantage is that it is compact in size, capable of fitting fully within the truck outline limit, and housed within a truck body recess of limited breadth.

Another advantage is that bins can also be picked up where placed close to such obstructions as poles, building walls, parked vehicles, and the like, thanks to its angular movement feature in a vertical plane.

An additional advantage is that the operations can also carried out in narrow streets, where the truck must be driven very close to the bin, inasmuch as the arm lowering by rotation in a vertical plane from the hinge center is unhindered by the front wall of the bin and allows the latter to be engaged in any case.

A not least advantage of the inventive device is its simple constructions, which authorizes reliable and long-term trouble-free operation expectations.

Understandably, the device described in the foregoing may be modified and altered in many ways by the skilled one in the art to meet contingent specific demands, without departing from the invention true scope as set forth in the appended claims.

Claims

- 5 1. A device (9) for engaging, lifting and tilting a trash or refuse bin (10), intended for a side loading truck (1), being of a type which comprises bin-engaging arms (11), and bin-lifting (14) and -tilting (15) means associated with a slide (12) movable toward and away from the bin (10) and mounted on the truck (1), characterized in that said bin-lifting means (14) comprises an articulated quadrilateral (27) having a fixed side (17) rigid with the slide (12), a pair of rocker arms 25,26), and a movable side (21) to which the bin-engaging arms (11) are connected.
- 10 2. A device according to Claim 1, characterized in that one (26) of the rocker arms (25,26) can be extended by the action of a drive means (32), said extensible rocker arm (26) constituting said bin-tilting means (15).
- 15 3. A device according to Claim 2, characterized in that said drive means (32) comprises an oil-operated cylinder (33).
- 20 4. A device according to Claim 3, characterized in that said oil-operated cylinder (32) itself constitutes said rocker arm (26).
- 25 5. A device according to Claim 4, characterized in that said bin-engaging arms (11) are movable angularly out of the way in a vertical plane.
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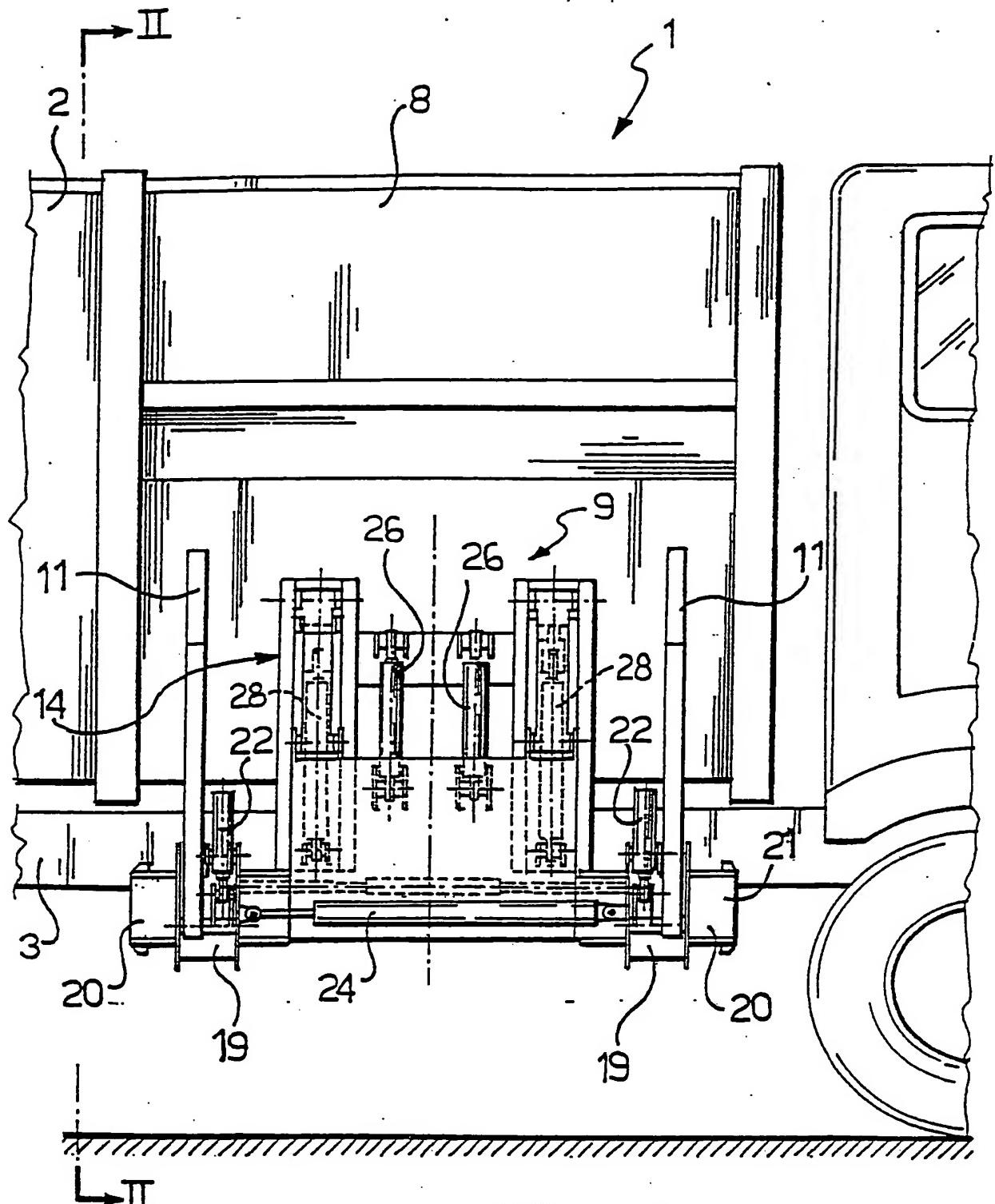


Fig-1

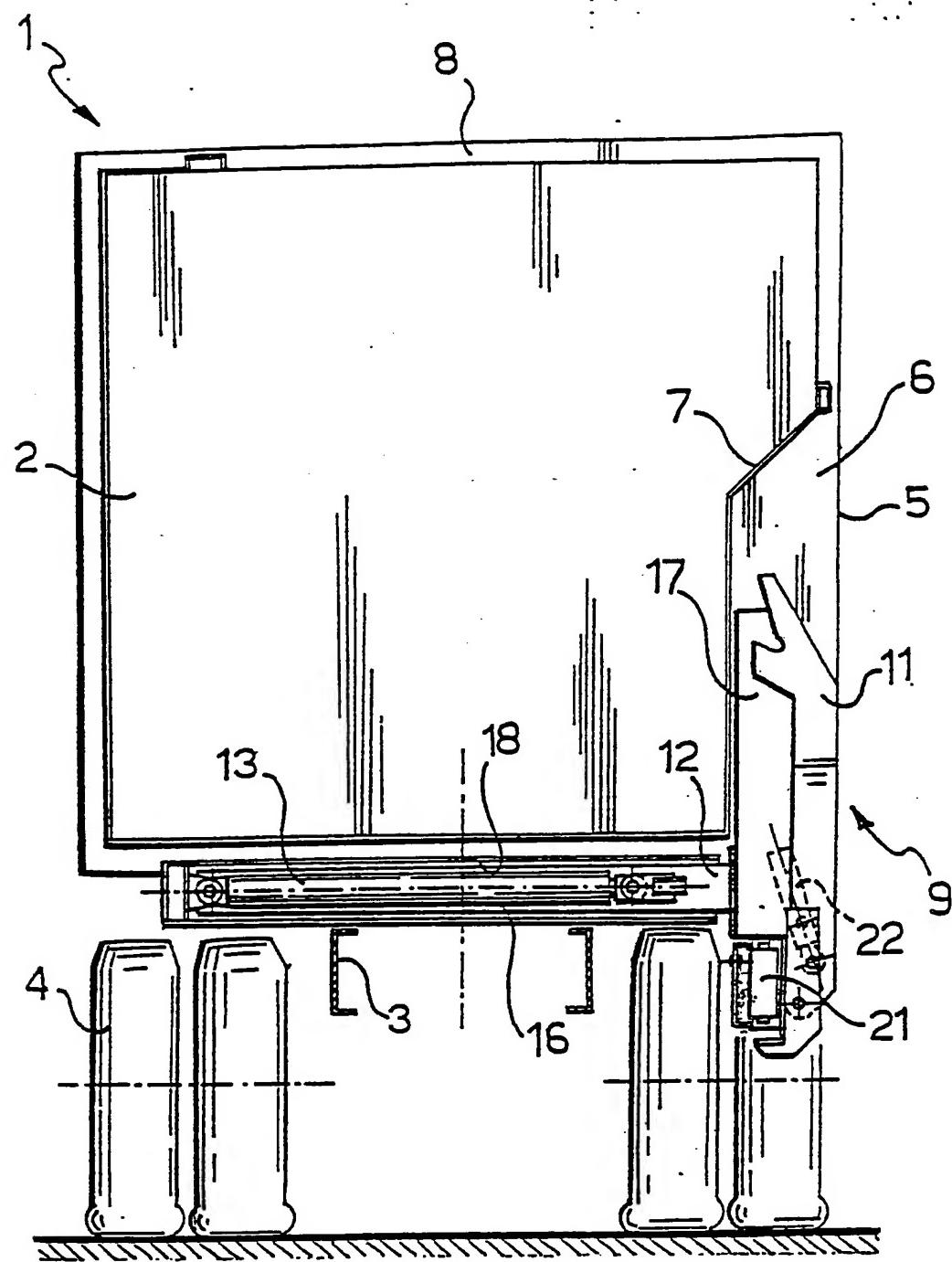


Fig-2

Fig - 3

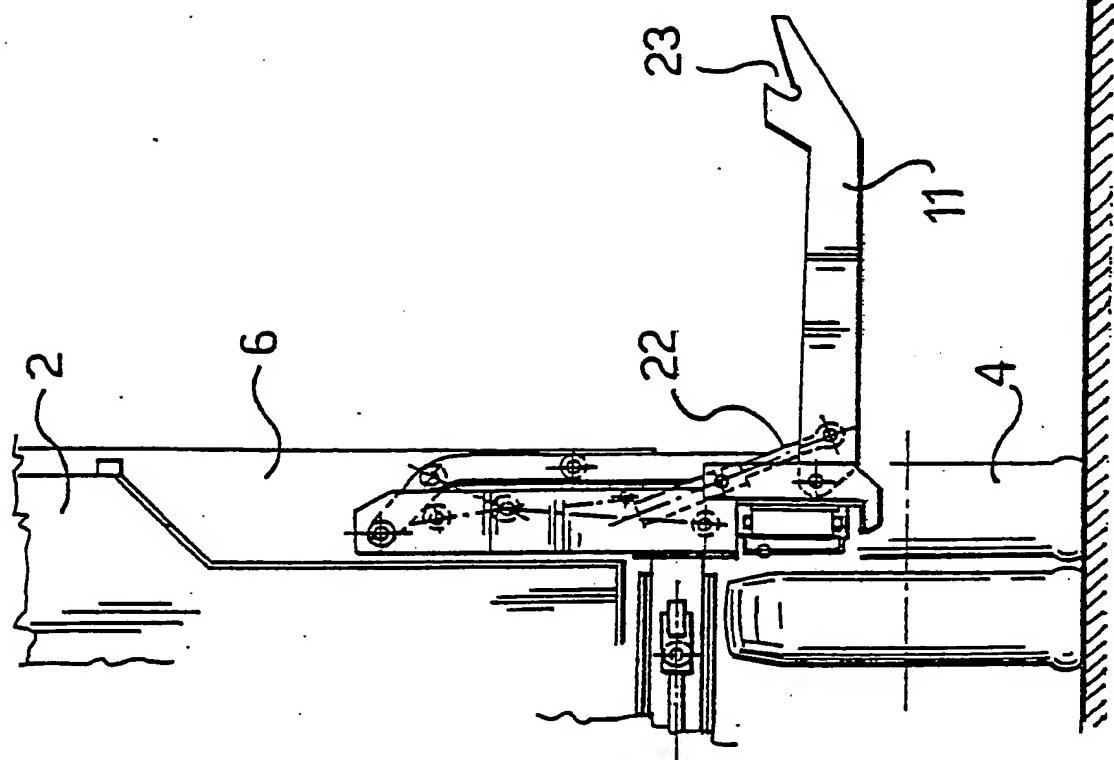
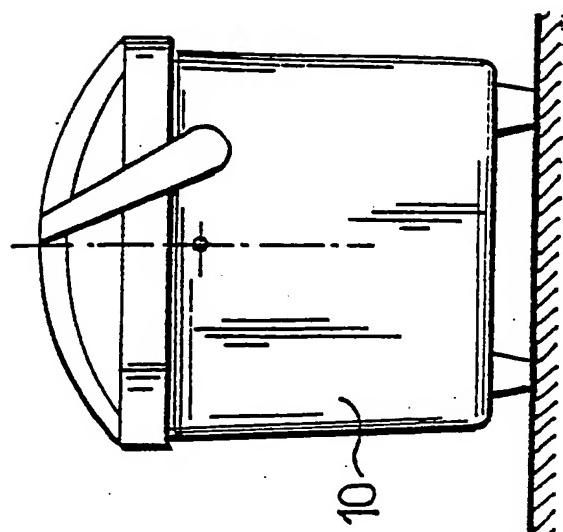


Fig-4

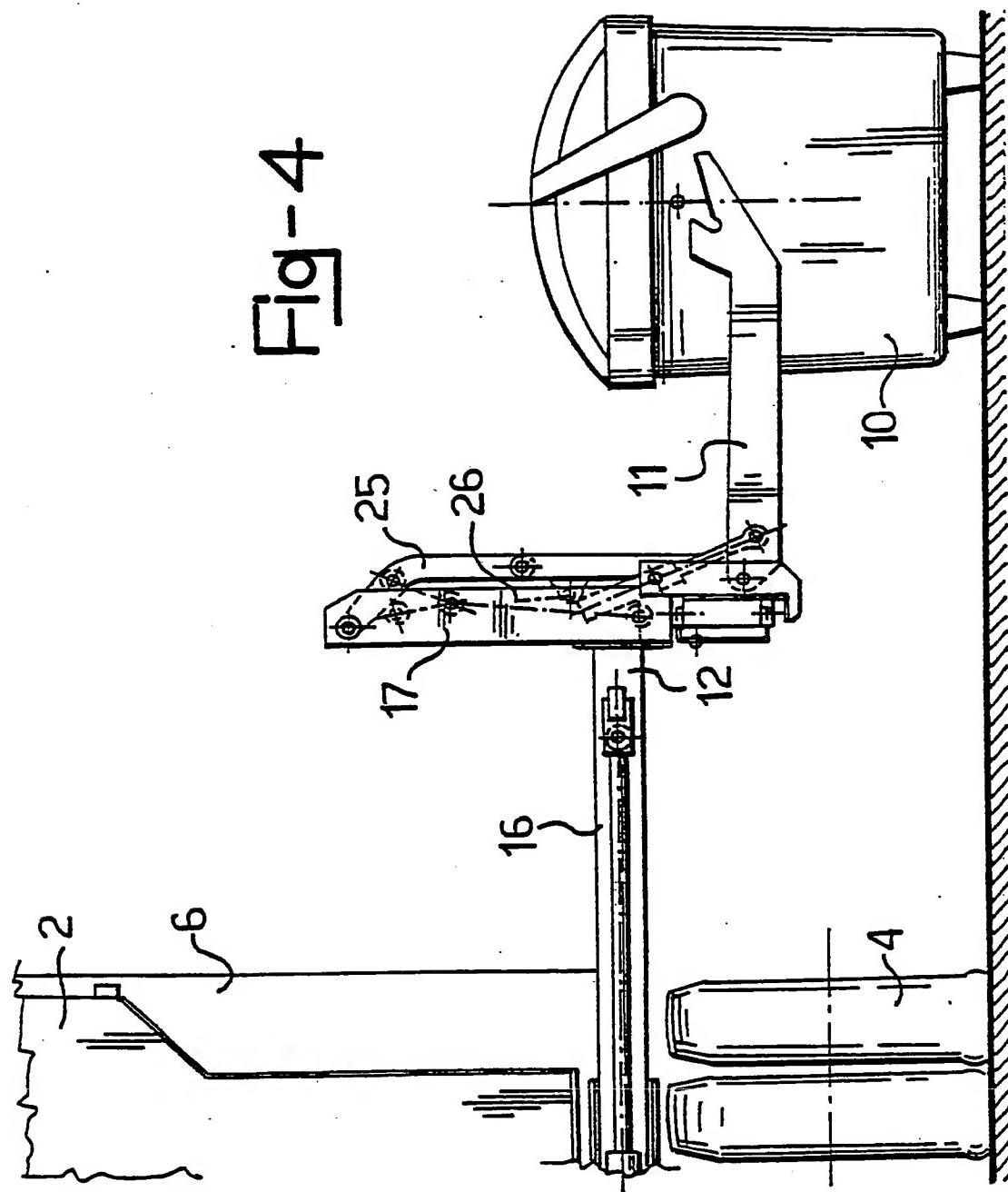
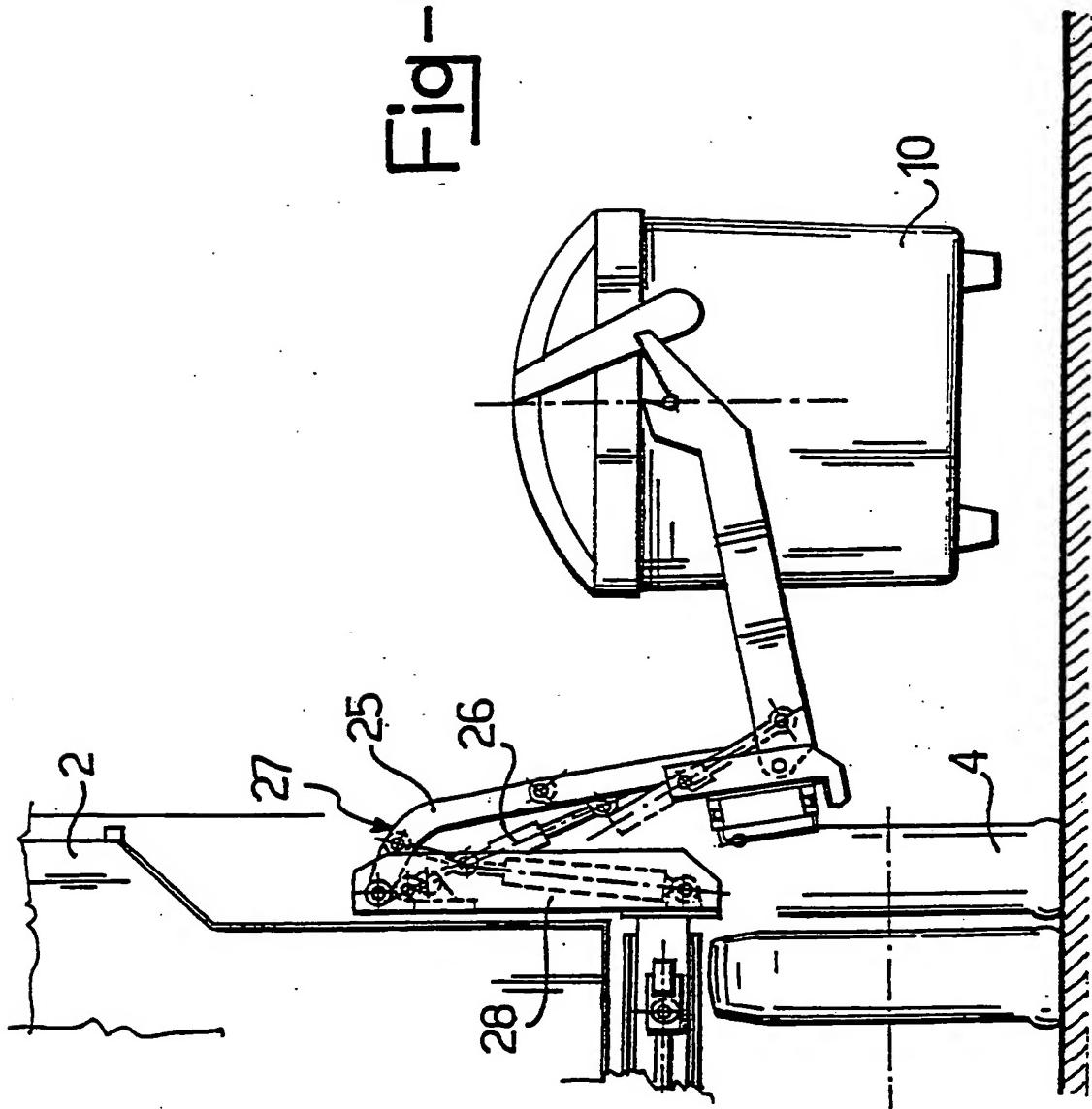
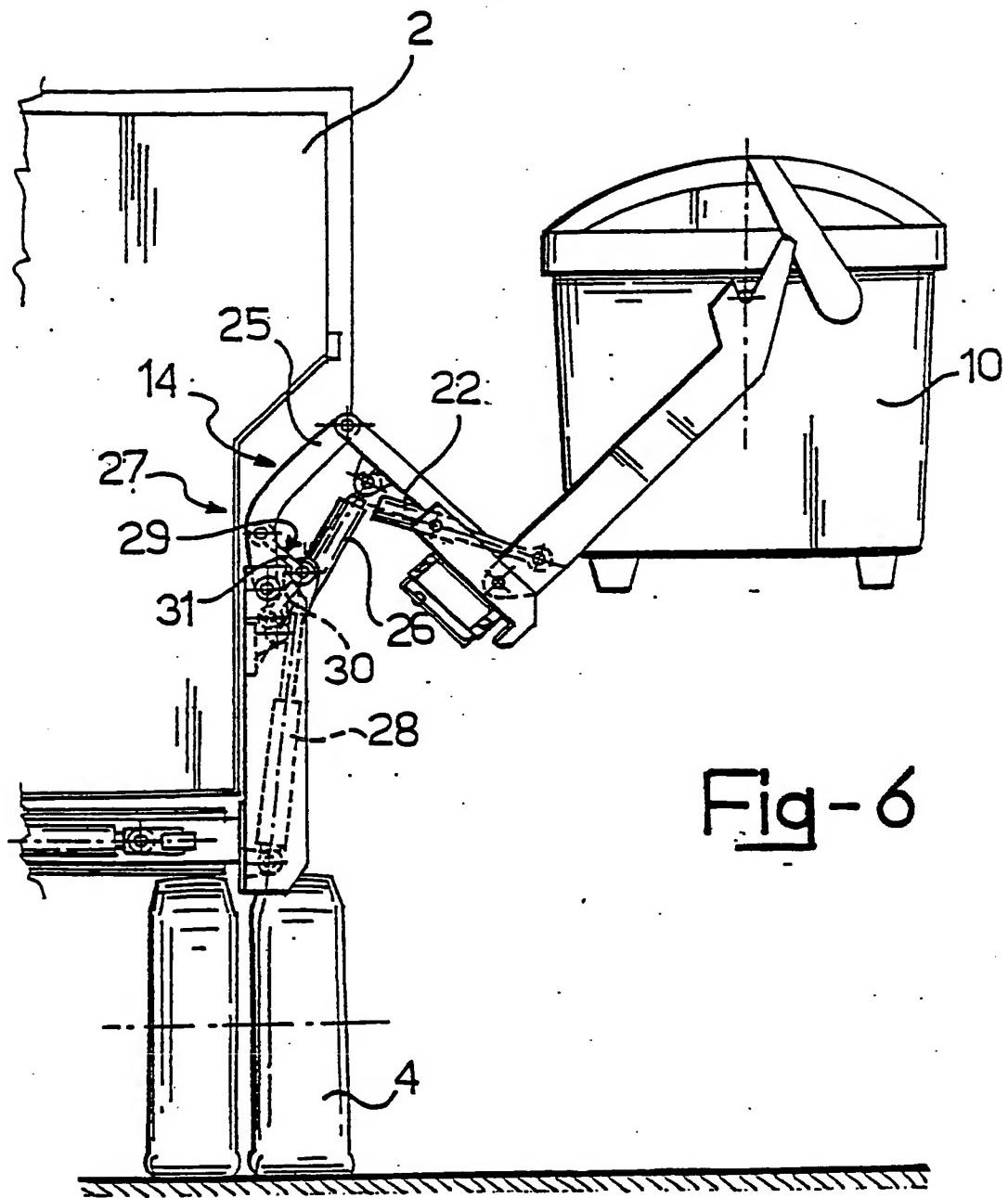
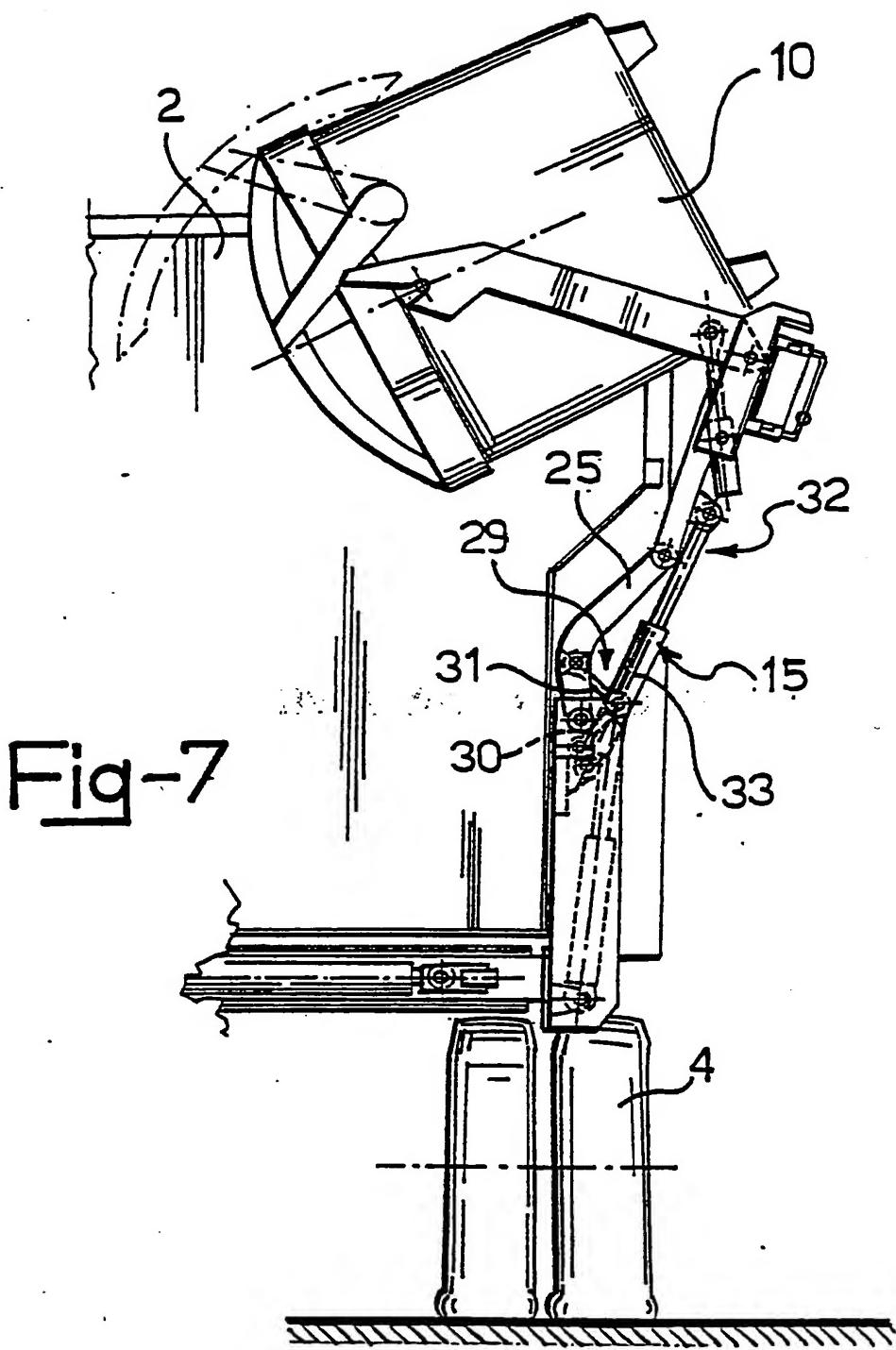


Fig-5







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